CORRIDOR INTEGRATED WEATHER SYSTEM (CIWS)

KEEPING PACE WITH DEMAND:

The FAA Operational Evolution Plan (OEP) identifies *en route severe weather* as one of the four key problems that must be addressed if the U.S. air transportation system is to alleviate the growing gap between the demand for air transportation and the capacity to meet that demand.

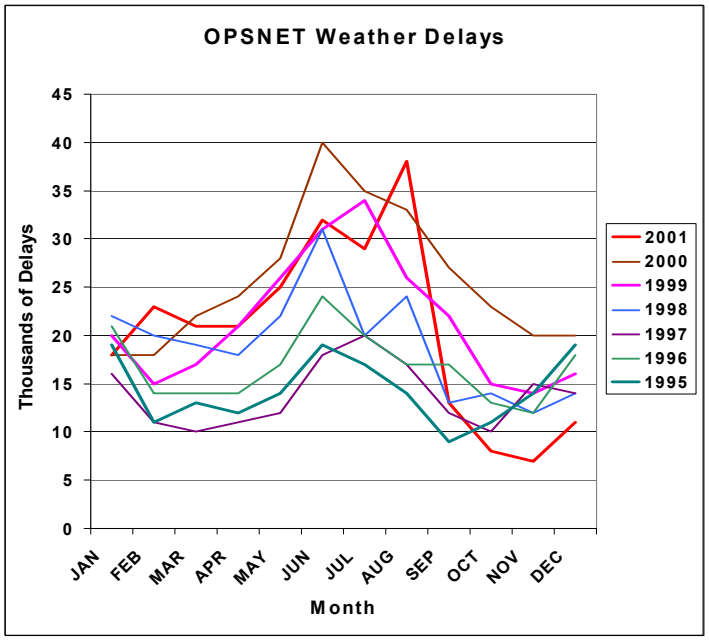
Existing operational forecast products within en route airspace are limited. Most en route weather decision support systems show only current and past storm locations. The Aviation Weather Center provides two products: the National Convective Weather Forecast (NCWF) with 1- hour forecast contours, and Collaborative Convective Weather Forecast Products (CCFP) 2, 4, and 6-hour predictions that are updated every four hours.

THE SOLUTION:

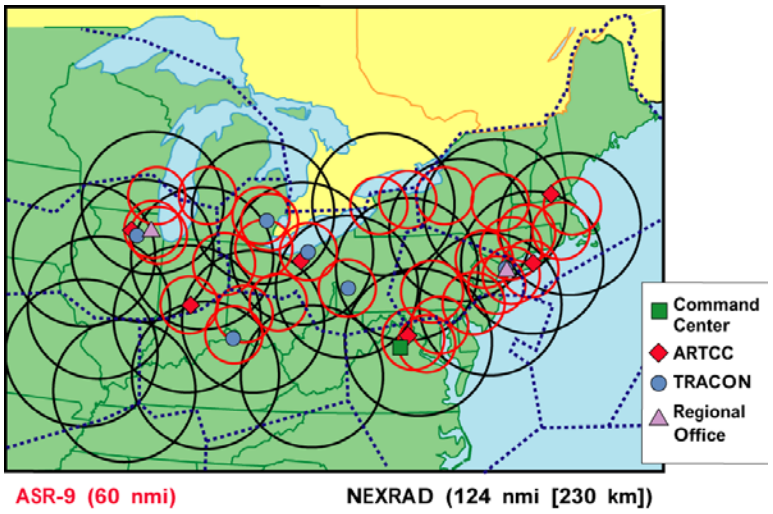
The solution is to take advantage of the high density of existing FAA and NWS weather sensors in the congested en route corridors, and the FAA-funded research conducted on thunderstorm evolution, to dramatically improve the accuracy and timeliness of the storm severity information and, to provide state-of-the- art short-term forecasts.

By providing en route traffic flow managers with accurate, automated, high update information on storm locations and echo tops along with 2-hour high resolution animated growth and decay forecasts of storms, the managers will achieve more efficient tactical use of the airspace, reduce controller workload, and significantly reduce delay. These "tactical" traffic flow management products will complement the longer-term (2-6 hour) national CCFP forecasts that are also needed for flight planning and traffic flow management.

As shown above, terminal and en route weather sensors are utilized to create the Corridor Integrated Weather System (CIWS) products: the rapid update rate of the ASR-9 radars (30 seconds) is utilized to detect rapidly growing cells, while the NEXRAD provides 3-D storm information and information on boundary layer winds. Data from lightning sensors and GOES satellites (not shown) is also integrated with the radar.

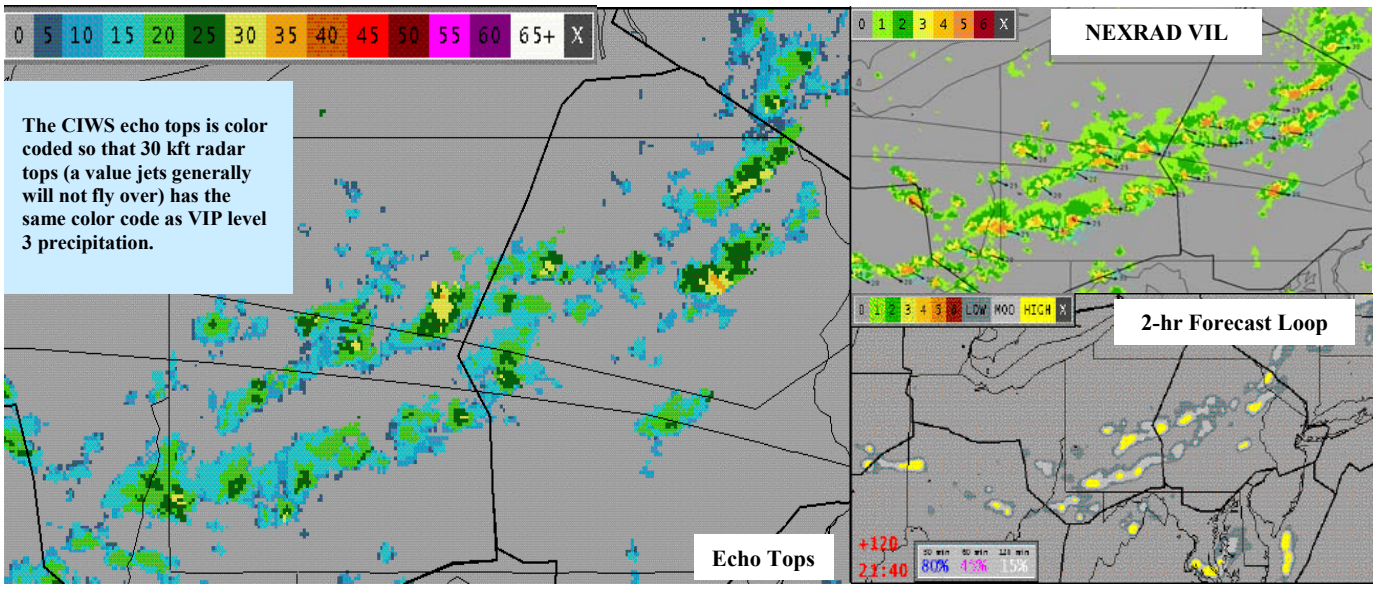


For over 30 years, it has been suggested that delays were the result of insufficient IMC capacity at airports. If this were the case, then one would expect delays to be increasing in the late fall and winter. However, the delays have gone up during the months of the year characterized by thunderstorm activity. En route thunderstorms are a principal contributor to these delays.



Coverage of sensors integrated in the 2002 CIWS demonstration.

MIT Lincoln Laboratory



CIWS display during the severe weather event of 24 August 2002. The RCWF provides CIWS 15-120 minute animated forecasts (lower right hand window). A key feature is the real time indication of forecast accuracy. The upper right window shows the NEXRAD VIL mosaic product. The echo tops product (left) shows that high level VIL returns are associated with relatively low echo tops. The CIWS echo tops information permitted many aircraft to safely fly over the storms in Pennsylvania, thus significantly reducing aviation delays.

The CIWS precipitation and storm motion products represent significant improvements to the ITWS precipitation and storm tracking algorithms. Much more accurate echo tops information is generated by Lincoln developed algorithms. Forecasts for prediction times from 15 to 120 minutes are provided by the Regional Convective Weather Forecast (RCWF), which uses the Lincoln-developed "scale separation" storm tracking technology. Very high spatial solution of the precipitation and echo tops products (2 km) will enable users to efficiently manage traffic in highly congested airspace including the major terminals within the Great Lakes and Northeast corridors.

NEAR TERM PLAN:

The CIWS is in the concept exploration phase. A demonstration began in July 2001 in the "Great Lakes Corridor" under the supervision of the Aviation Weather Requirements Directorate (ARU) and AUA-460 and has continued in 2002. MIT Lincoln Laboratory developed and operates the CIWS.

Displays are provided at key ARTCCs (ZOB, ZDC, ZAU, ZBW, ZNY, ZID), the ATCSCC and major terminals (New York City, Chicago, DTW, PIT, CLE, and CVG). Airline systems operations centers have access to the products via servers on the Internet and CDMnet as well via dedicated displays. The delay reduction benefits, which are currently being quantified, are expected to exceed $50 M in 2002.

OUT YEAR PLAN:

In 2003, studies of possible CIWS operational implementation options will be conducted and the potential benefits of incorporating products from the production ITWS systems into CIWS will be explored. The use of CIWS at small airports will be assessed. Forecasts of convective initiation will be provided through the use of new forecast techniques, as well as data from satellite imagery and the TDWRs. The CIWS will be interfaced to traffic management decision support tools such as the Route Availability Planning Tool (RAPT).

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